DESCRIPTIONS OF THE MALE OF *MONTEZUMINA INCA* (ORTHOPTERA: TETTIGONIIDAE) AND ANOTHER NEW SPECIES FROM CENTRAL AMERICA[1]

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ABSTRACT: The male of *Montezumina inca* is described for the first time, substantiating the hypothesis that this northern South American species in a predominantly Central American genus is related to members of the *bradleyi* group, based on color patterns of the forefemora and morphological similarities of the male tenth tergum and cercus to members of that group. A newly discovered Central American species—*Montezumina maya*, new species—is also described herein. Based on the presence of styles on the male subgenital plate, it is a cryptic species closely related to *M. longistyle*.

When Hebard (1925) erected the bush katydid genus *Montezumina*, he included in it the species *Turpilia oblongoculata* Brunner von Wattenwyl 1878, *T. ocularis* Saussure and Pictet 1897, and *T. oridiops* Saussure and Pictet 1897. He later described (1927) the species *M. bradleyi*, based solely on the female, and the subspecies *oblongoculata mesembrina* (elevated to species by Nickle (1984)). Hebard (1934) later added *Symmetropleura modesta* Brunner von Wattenwyl, the only species found in the United States. Marquez (1965) described *M. longistyle*, an unusual species because of the presence of true articulating styles on the male subgenital plate, and Nickle (1966) described another species *M. granti*, as well as the male of *M. bradleyi*.

Nickle (1984) revised the genus *Montezumina*, presenting information on a total of 25 species, 16 of them previously undescribed. These species range geographically from the United States (VA to IL, south to FL, AL, MS, and TX) into northern South America (*M. guyana* Nickle from Guyana, *M. walkeri* Nickle from Colombia, and *M. inca* Nickle from Peru). Although most species were described on the basis of males only or both sexes, one species—*M. inca*—was described from a single female collected in Madre de Dios, Peru. This species is atypical in that the forefemur is expanded, with broader ventral spines, the color patterns are present on other parts of the body (unique for the genus), and the range is well south of the normal distribution of other members of this genus (88% of the species are distributed from northern Mexico to Costa Rica [only *M. modesta*, *M. walkeri*, *M. inca*, and *M. guyana* are found beyond this range]. Nickle suggested that *M. inca* is related to *M. bradleyi*, based solely on the presence of color patterns on the mesial face of the forefemur. The markings of the *bradleyi* group consist of some variation of a blackened

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"E" on the mesial face of the forefemur and a simple black horizontal line on the external face. Although the markings on *M. inca* (consisting of a blackened irregular pattern on the mesial face but only reddish blotches on the dorsal and ventral margins of the outer face) only superficially resemble the patterns defining the *bradleyi* group, the presence of color patterns on the forefemur suggested a relationship to the *bradleyi* group.

Characters of the male genitalia are more important in establishing species affinities, and it was hoped that the discovery of the male of *M. inca* would resolve the question of group affinity. After nine years of collecting orthopteroid insects in northern Peru as part of an Earthwatch project (Amazon Katydids) (1986-1995), only three additional specimens of this species have been collected, including the first male, described herein. Based on the more reliable characters of the male genitalia, rather than on color patterns on the forefemur alone, *M. inca* is most closely related to *M. guyana* and, as previously speculated by Nickle (1984), is associated with members of the *bradleyi* group.

In a collection of Orthoptera sent to me from Dr. Richard Brown, Mississippi State University, a male of a heretofore undescribed species of *Montezumina* from Panama was discovered. Additional specimens from Costa Rica in the orthopteroid collection at the Instituto Nacional de Biodiversidad de Costa Rica (INBio), Heredia, Costa Rica, have added to our knowledge of this species, described herein as *Montezumina maya*, new species.

Specimens from the study are deposited in the U.S. National Museum of Natural History, Washington, DC [USNM] and at the Instituto Nacional de Biodiversidad de Costa Rica [INBio].

Montezumina maya Nickle, NEW SPECIES

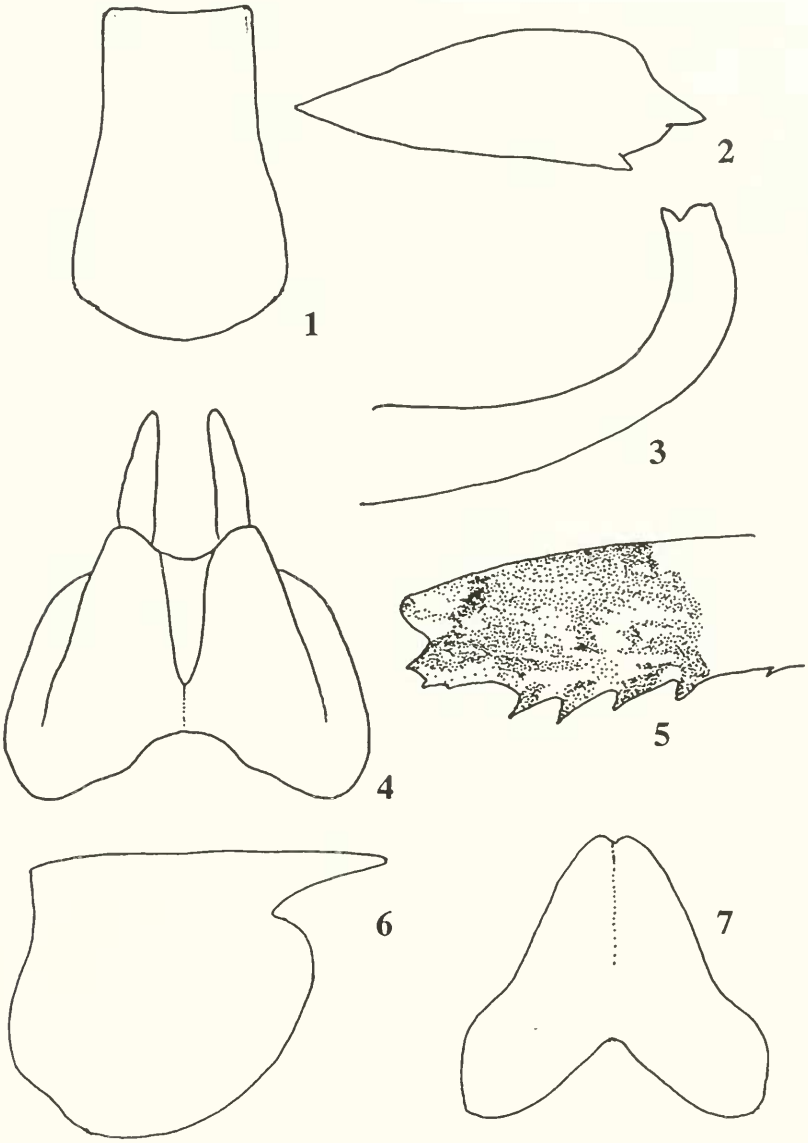
(FIGS. 1-7, 13)

Diagnosis. Dark spots are absent on all corners of the pronotal disc [present on the posterior corners only in *bradleyi bradleyi*, the other Panamanian species of this group]. Articulating styles are present on the apex of the subgenital plate, and the cerci are apically armed with a well developed dorsal tooth and a broader ventral blade. Differing from *longistyle* on the basis of the darker maculation on the mesial face of the forefemur and the more gracile, apically toothed ♂ cercus.

Holotype. Male. PANAMA: Cerro Campaña, 800 m. Jan. 2-3, 1987. (coll. J. R. MacDonald) [USNM]. Allotype. Female. COSTA RICA: Heredia. [INBio].

Description. Head. Eyes elongate, oval, 1.8x subocular genal length. Occipital rise >0.33x eye length. From above, interocular width equivalent to slightly less than one eye width. Fastigium nearly twice as wide as frons, both narrow, convergent, and attingent.

Thorax. Pronotal disc elongate, 1.47x longer than posterior width; posterior width 1.7x broader than anterior width. Dark maculations on all four corners of disc. lateral lobe of pronotum as in Fig. 6.



Figures 1-7. Morphological features of the holotype of *Montezumina maya*. 1. pronotal disc; 2. lateral genicular lobe of hindfemur, left lateral view; 3. left cercus, lateral view; 4. subgenital plate, ventral view; 5. color pattern on inner face of forefemur; 6. latral lobe of pronotum; 7. subgenital plate of allotype, ventral view.

Wings. Tegmen 5.6x longer than wide. Hindwings extending 4.9 mm beyond tegmina in repose. Stridulatory vein 1.99 mm.

Legs. Hindfemur 8.1x longer than wide. Inner face of forefemur ornamented with a dark brown mottled pattern. Ventral margin of forefemur bearing 4 large broad spines beneath mottled pattern and two smaller spines near midpoint. Posterior margins of hindtibia each armed with 25-26 spines. Lateral genicular lobe of hindfemur as in Fig. 2.

Abdomen. Male: Tenth tergum produced, medially depressed, and apically deflexed between cerci. Cercus long, cylindrical, gradually curving medially to apical third of its length, then more acutely dorsomedially to apex; apex armed with a sharp dorsal tooth and an adjoining broader cutting blade (Fig. 3). Subgenital plate spatulate, apically with a U-shaped median emargination, and armed with two well developed articulating styles (Fig. 4). Female: Subgenital plate as in Fig. 7.

Coloration. A narrow band extending from dorsal rim of compound eye toward anterolateral corner of pronotal disc; small brown maculations absent at each of four corners of pronotal disc (Fig. 1). Apical third of mesial face of forefemur mottled brown (Fig. 5); foretibia with dark markings, especially on leading edge and in areas surrounding spines, beneath tympanum, and along apical fifth. Apical fifth of midtibia mottled dark brown. Penultimate tarsal segments of all legs black, others brown or green.

Paratypes. 10 males, 8 females. COSTA RICA: Prov. Ajal. Fca. San Gabriel, 2 km SW Dos Rios, 600 m. VII-1988. 1 male [INBio]; Guanacaste Prov. Est. Pitilla, 9 km S Santa Cecilia, P.N. Guancaste , 700 m. various dates and collectors 9 males, 8 females [INBio].

Distribution. The range of this species extends from Heredia Province, Costa Rica, to Cerro Campaña, Panama.

Measurements (n = 5 specimens, each sex; mm; $\bar{x}$; R). Total length: male 35.59, 34.94-36.41; female 35.75, 34.10-38.10; length pronotal disc: male 4.24, 4.09-4.39; female 4.29, 4.11-4.71; posterior width pronotal disc: male 2.90, 2.86-2.93; female 2.95, 2.85-3.17; length hindfemur: male 17.47, 16.63-17.94; female 18.39, 17.87-19.10; width hindfemur: male 2.32, 2.24-2.39; female 2.50, 2.41-2.70; length tegmen: male 27.33, 25.44-32.07; female 28.02, 27.24-30.20; width tegmen: male 6.07, 5.38-6.45; female 6.23, 5.57-6.84; ovipositor: female 5.59, 5.29-6.05.

Etymology. This species is named after the Mayan Indians.

Discussion. *Montezumina maya* possesses characters that link it with several species in the *bradleyi* group and is most closely related to *M. longistyle*. Both species differ from other species by the presence of articulating styles on the male subgenital plate. Though the shape of the male cercus is similar for these species (Fig. 13), the apex is more heavily armed in *M. maya*. One distinctive color pattern differs as well; the mesial face of the forefemur is deeply mottled (more similar to that of *M. inca* or *M. guyana*, two related South American species), while in *M. longistyle* it is very lightly patterned in the shape of the letter "E" (Fig. 13).

Montezumina inca Nickle

(Figs. 8-12)

Montezumina inca Nickle 1984: Trans. Amer. Entomol. Soc. 110: 592.

Diagnosis. Male. Tenth abdominal tergum medially declivent, its lateral margins acutely arcuate over bases of cerci. Cercus short, cylindrical, with a median inflated ridge arising along midportion of body of cercus, apically

upcurved, and terminating as a broad blunt tooth. Mesial face of forefemur inflated and marked with a mottled irregular blackened patch.

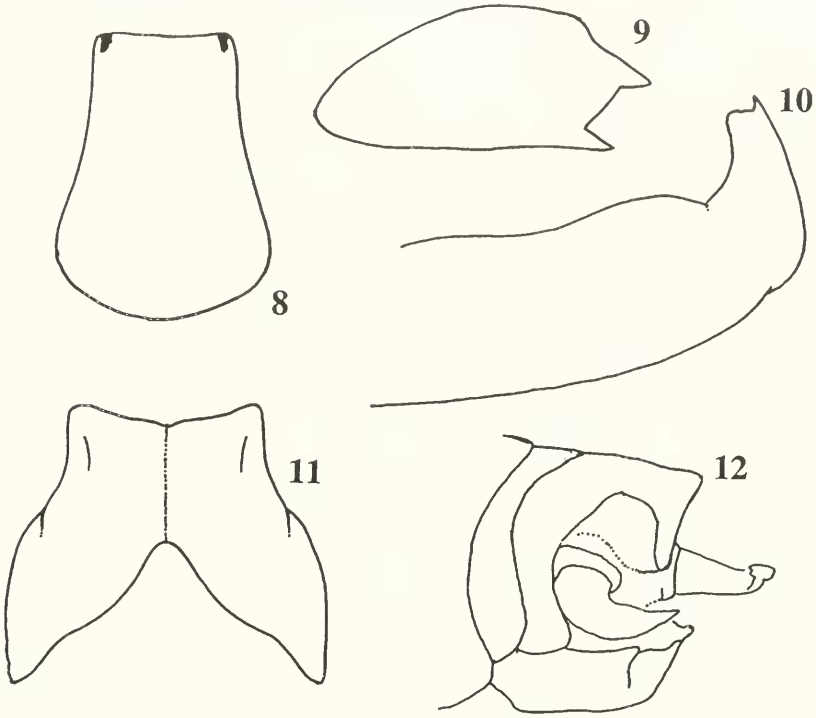
Head. Eyes elongate, oval, subocular genal length equal to about 0.8x length of eye. Occipital rise about 0.33x eye length frons distinctly bilobed; fastigium and frons convergent and attingent.

Thorax. Pronotal disc short, 3.4 mm in length; 1.33x longer than posterior width (Fig. 8).

Wings. Tegmen 5.0x longer than wide. Hindwings extending 4.0 mm beyond tegmina in repose.

Legs. Hindfemur 6.0x longer than wide. Ventromesial face of forefemur inflated, bearing 3 broad spines. Midtibia moderately inflated, gradually tapering apically from distal third of its length. Posterior margins of hindtibia each armed with 27 median and 25 lateral spines. Lateral genicular lobe of hindfemur as in Fig. 9.

Abdomen. Tenth abdominal tergum medially declivent, its lateral margins acutely arcuate over bases of cerci (Fig. 12). Cercus short, cylindrical, with a median inflated ridge arising along midportion of body of cercus, apically upcurved, and terminating as a broad blunt tooth (Fig. 10). Subgenital plate spatulate (Fig. 11).



Figures 8-12. Morphological features of the male sex of *Montezumina inca*. 8. pronotal disc; 9. lateral genicular lobe of hindfemur, left lateral view; 10. left cercus, lateral view; 11. subgenital plate, ventral view; 12. tip of abdomen, posterolateral aspect.

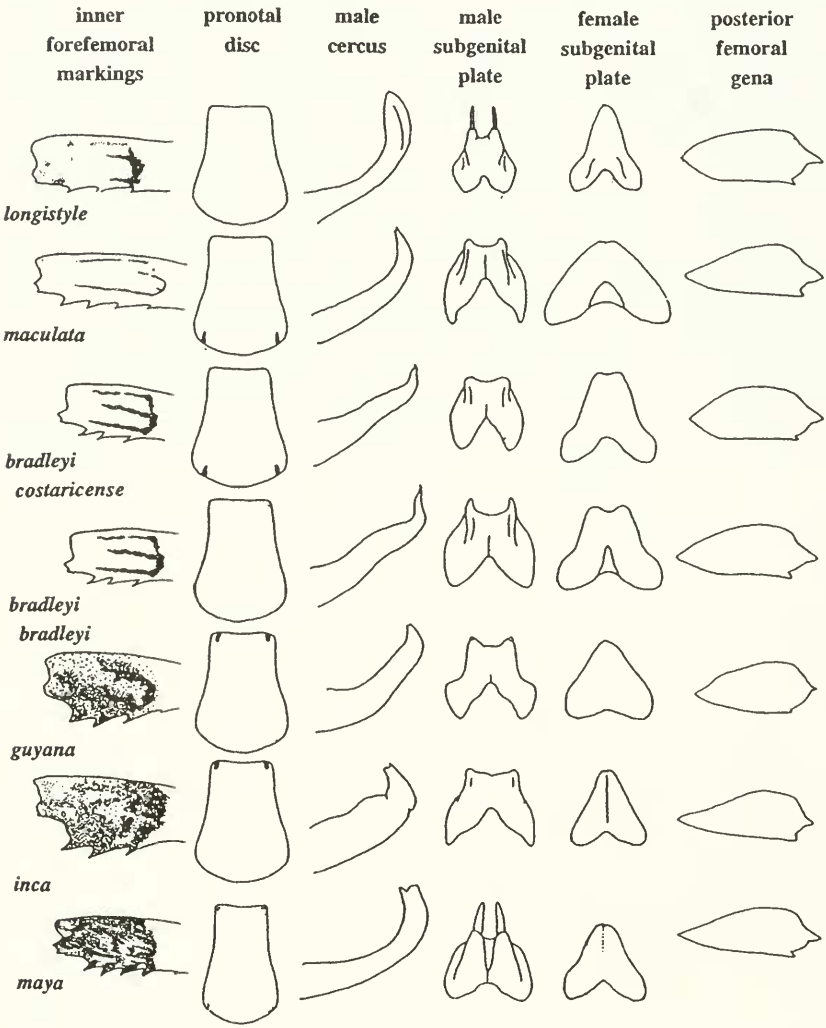


Figure 13. A comparison of key morphological features of *Montezumina* species of the *bradleyi* group. Features are the left lateral hindgenicular lobe, lateral view; mesial face of forefemur, median view; male and female subgenital plates, ventral view; left male cercus dorsolateral view; and pronotal disc [diagramatic], dorsal view.

Coloration. The color patterns on this sex are essentially the same as those described in Nickle (1984: 592) on the female holotype.

Distribution. The range of this species is extended into Loreto Province, 40 km NE of Iquitos, at the Explorama Inn (3°26'S, 73°02'W), but it is probably found throughout rainforests extending from Madre de Dios to the Peruvian Amazon River basin.

Measurements (♂; mm; $\bar{x}$). Total length: 28.97; length pronotal disc: 3.60; posterior width pronotal disc: 2.70; length hindfemur: 14.92; width hindfemur: 2.38; length tegmen: 21.10; width tegmen: 4.41.

DISCUSSION

Nickle (1984) divided the 25 species of *Montezumina* into six species groups, based primarily on shared male genital characters. Development of the tenth tergum displays a variety of character states, including: "not produced, truncate" (*ocularis* and *granti* groups), "produced and strongly declivent" (*oblongoculata*, *sinaloae*, and *oridiops* groups). Cercus shape also displays discordant character states, including: "short and robust, with large apical teeth" (*ocularis* group), "long and sinuate, round in cross section to the apex, and terminating in a gracile apical tooth" (*oblongoculata* and *bradleyi* groups), "very long and sinuate, round in cross section to the apex, and terminally blunt with a small apical tooth" (*sinaloae* group), and "long, round in cross section at basal portion but distally upcurving and becoming laterally flattened" (*oridiops* group). *Montezumina inca* differs from other species in the *bradleyi* group in the degree of deflexion of the tenth tergum between the cercal bases: from weakly produced (*bradleyi bradleyi*), to moderately produced and weakly deflexed (*bradleyi costaricense*), to both strongly produced and deflexed (*guyana*), to weakly declivent (*longistyle*), and finally, to strongly declivent (*inca*). There is a similar trend among these species in the shape of the cercus: from elongate and sinuate to the apex (*bradleyi bradleyi*, *b. costaricense*, and *maculata*) to compressed and apically blunt (*longistyle*) to apically blunt with a tooth (*guyana* and *inca*). *Montezumina inca* appears to be most closely related to *M. guyana* on the basis of forefemoral and pronotal disc color patterns and shape of the male cercus. Other characters useful in separating these species are presented in Fig. 13.

Montezumina maya is recognized as a sibling species of *M. longistyle*, based primarily on the unusual stylated subgenital plates of the males.

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